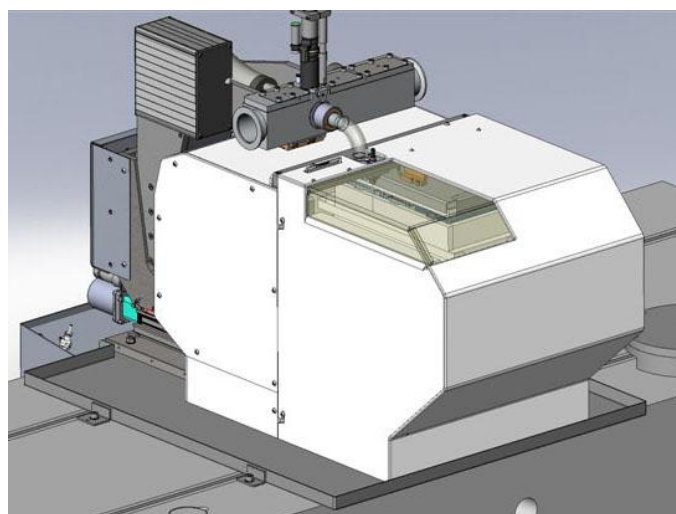


EMBL

Bio-SAXS SAMPLE CHANGER ID14-3

EMBL
ESRF

INSTRUCTION NOTES **USER MANUAL**



User manual

User manual

Release

Release	Date	Name	Note
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1 General information

1.1 Bio-SAXS Sample Changer description

Sample Changer for Bio-SAXS is a scientific instrument installed at the ID14-3 beam line of the ESRF which allows to expose a liquid solution into an X-ray beam in order to analyse it.

The robot has 5 parts: SEU (Sample Exposure Unit), SCU (Sample Changer Unit), the fluidic rack, the controller rack and a PC.

1.1.1 SEU – Sample Exposure Unit

The Sample Exposure Unit contains a quartz capillary glued into an inox fix support (pod) placed in X-ray beam under vacuum in which the analysed liquid is transferred, a camera and a lighting system to visualise the capillary.

The cell is thermally controlled between 2 and 60°C.

1.1.2 SCU – Sample Changeur Unit

The Sample Changer Unit is able to displace sample plates along three axes. Its cleaning system contains two wells: one with detergent and water, second well with dry air.

1.1.3 Fluidic rack

The fluidic rack ensures sample recuperation after its X-ray exposition in the SEU, capillary cleaning and temperature regulation in the SCU and SEU using two independent liquid circuits.

1.1.4 Controller rack

The controller rack provides the supply of various Sample Changer modules by electricity and compressed air (SEU-SCU-Fluidic rack).

It contains also a programmable automate to operate different modules.

1.1.5 PC

PC standard equipped with the application SC_BS allowing to run Sample Changer.

1.2 Handling, qualified personnel

The Sample Changer maintenance and handling has to be carried out by designed personnel. All interventions as dismounting, reparation and others have to be performed by following qualified personnel:

FELISAZ Franck	Tel : 7188	E-mail : felisaz@embl.fr
FODINGER Lukas	Tel : 7951	E-mail : lfoding@embl.fr
GIRAUD Thierry	Tel : 2829	E-mail : giraud@esrf.fr
CASEROTTO Hugo	Tel : 2953	E-mail : hugo.caserotto@esrf.fr
GOBBO Alexandre	Tel : 7949	E-mail : gobbo@embl.fr
HUET Julien	Tel : 7714	E-mail : huet@embl.fr
VILLARD Cyril	Tel : 7875	E-mail : cvillard@embl.fr

1.3 Security

In general, the user has to follow security rules valid at the ESRF site. In particular those which concern following operations: the electric link of a given apparatus with a certified and protected socket, the respect of compressed air use rules, etc.

Stickers are put on some elements of Sample Changer. It is important for your security, that you follow the instructions written on them; they prevent from possible risks (electric, chemical, optic ...).



It is forbidden to dismount the fix protection covers which protect Sample Changer device itself AND also its users!

The movable Plexiglas cover is provided with a contact which shut down the power of motors, pumps and compressed air when this cover is not in the closed position.

During a normal use, the Sample Changer can be powered ON and OFF as described in the §2 of this document. However, in the case of emergency, there are two ways how to stop it immediately:

- Two emergency stop buttons are situated on the marble table (one in front and second behind of the SCU). They shut down the electric power supply as well as pneumatic of SC.



Sample Changer emergency stop button

- The beam line emergency stop buttons are situated on the walls of the experimental hutch as shown on the photograph on right. **ATTENTION!!!!** : Pressing this button will shut down electric power supply of the entire beam line ID14 (i.e. all 4 end-stations)!!! Beam line RE-start-up represents a complicated and time consuming task which can take several hours. The beam line emergency stop button has to be used only in the case of danger.



Chemical and biological risks:

The DETERGENT canister contains a solution of the HELMANEX II (2%) which is a corrosive chemical.

The WASTE canister contains the KORSOLEX and the HELLAMNEX II in solution, being both corrosives.

When manipulating these canisters, the use of gloves and glasses is obligatory (consult security sheets).

Information and security sheets of the HELLAMNEX II can be found on:

www.chem.agilent.com/Library/msds/8529EU.French.pdf

Information and security sheets of the KORSOLEX are on:

www.bode-ch.com/media/sdatenblaetterbodefr/korsolex_endo_cleaner_fr.pdf

The sample defined **RED** by the ESRF safety cannot be investigated using the Sample Changer.

The sample defined **YELLOW** by the ESRF safety can be investigated using the Sample Changer, however cannot be recuperated back into PCR tubes or micro-plates. After the loading of a yellow sample into the exposure capillary, the sample can be only evacuated into the waste canister during the cleaning cycle.

The sample defined **GREEN** by the ESRF safety can be investigated using the Sample Changer and can be recuperated into PCR tubes or micro-plates after its loading into the exposure capillary or evacuated into the waste canister during the cleaning cycle.

If during the manipulations of the WASTE canister a contamination occurs: vaporize the KORSOLEX on an absorbing paper (spray and absorbing paper are available in the experimental hutch) and clean the contaminated surfaces. The gloves and absorbing paper have to be thrown away after use into the yellow trash labelled: DASRI (Déchet d'Activité de Soins à Risque Infectieux).

2 Sample Changer installation and start up

2.1 Sample Changer installation

→ See Bio-SAXS Sample Changer Maintenance guide.

2.2 Sample Changer start up

2.2.1 Electrical power supply

Sample Changer is permanently connected into the three phases networks of ESRF.

2.2.2 Pneumatic power supply

Sample changer is connected to the 6 bars air pressure network. The type connector is : quick 8mm (Festo).

2.2.3 Switching on the unit

First, switch on (1 position) the Sample Changer rotary switch placed into the beam line. (see following picture)



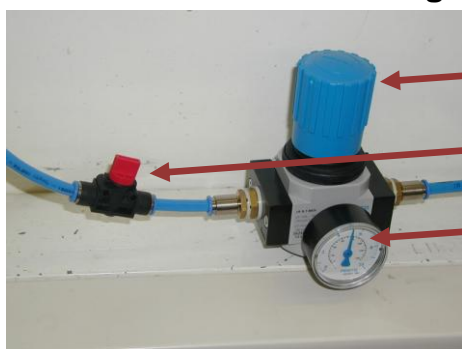
The two water baths are supplied.

In second time to switching on the machine: use the 3 push buttons on the front of electronic rack



- Activate the MAIN SWITCH : the switch green light is on. Beckhoff PLC is turned on , POWER ON et OFF light switch are on (blue and red),
- Activate the POWER ON switch : motors and pneumatic are turn on (if cover is closed).

2.2.4 Pneumatic switching on



- Pressure switch valve
- Pressure ON/OFF valve
- Pressure indicator

Turn pressure ON/OFF valve.

Pressure indicator must display 6 bars (± 0.2 bars), if necessary adjust the pressure with the pressure switch valve

2.3 Sample Changer stop

2.3.1 Electrical turn off

To stop the Sample Changer use the electrical rack switch or the main rotary beam line switch.

- Activate the POWER OFF switch : motors and pneumatic are turn off.
- Activate the MAIN SWITCH : switch lights are off, Beckhoff PLC is turned off , just two water baths are supplied.
- Activate rotary beam line switch and the machine is completely off.

2.3.2 Pneumatic turn off

Activate the Pressure ON/OFF valve to turn off the pneumatic.

2.3.3 Emergency stop

The Sample Changer has two emergency stop switch one in front of the SCU and one on the back of the SCU.

To turn off electrical and pneumatic power supply push one of two emergency stop switch.

To restart the SC, unlock the emergency stop switch (turn the button), and push POWER ON (blue switch) on electronic rack.

3 Use Sample Changer

3.1 Start, use and stop of the Sample changer

- Checking liquid tanks levels → §4.1.1,
- Pneumatic switching on if necessary → § 2.4,
- Electrical switching on → § 2.3,
- Starting BioSaxsSC PC and application software (BSSC) if necessary
- inspection of the POD → §4.1.2,
- Load sample and buffers into the Sample Changer → §4.1.3,
- Sample analyzing,
- Load new sample and buffer into the SC and analysing → §4.1.3,
- Unloading samples from the Sample Changer → §4.1.4,
- Stop the application software and the BioSaxsSC computer,
- Turn off the electronic rack → §3.1,
- Turn off the pneumatics if necessary → §3.2.

3.1.1 Checking the liquid levels



If filling or changing the canisters: **USE GLOVES AND SAFETY GLASSES** both can be found in the hutch.



-Inspection of the H₂O and DETERGENT canisters:

If the levels are low, **STOP THE POWER SUPPLY of the SC** and fill:

- H₂O can: distilled water
- DETERGENT can: 2% Hellmanex II, 10% Ethanol, 88% distilled water

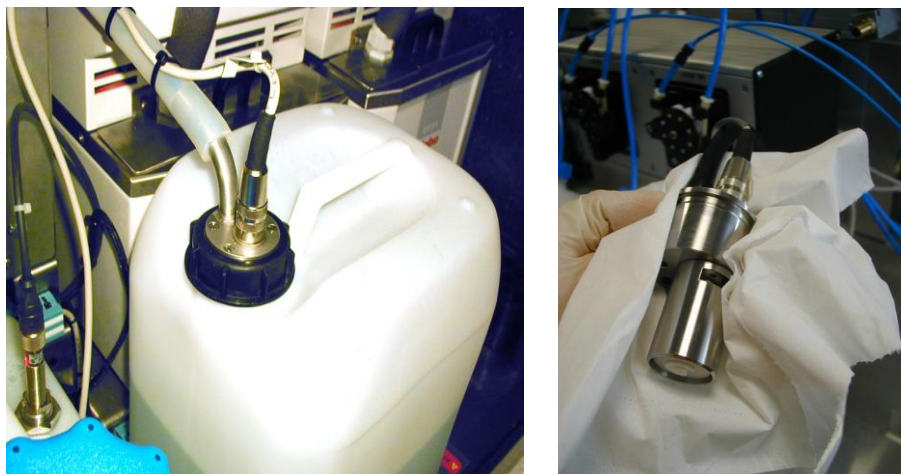


For the filling process just unscrew the blue cap, fill the can and close the cap again.

- Inspection of the WASTE canister:

If the can is full, **STOP THE POWER SUPPLY of the SC** and:

- unscrew the black cap (see photo on next page),
- pull out the level switch and the tube connection and wipe it with absorbent paper (see photo next page) ,
- put the level switch into a new WASTE can which contains 300ml of KORSOLEX,
- Throw the absorbent paper into a yellow waste bin located in the hutch,
- Carefully remove the full waste container to avoid spillage,
- use the black cup of the new canister to close the full one,
- bring the full waste can to a recycling point of the ESRF.



-Inspection that there is no liquid in the safety tray. If there is any liquid contact a member of the maintenance personal.

Containers holding fresh distilled water and cleaning solution should be available at the beam line. If they do not contain enough, water and ethanol can be obtained in the sample preparation laboratory near the beam line. HELLMANEX II (blue 1l bottle) is available at the beam line.

3.1.2 Inspection and replacement of the capillary



ATTENTION: the exposure unit is under vacuum, the capillary must be changed by the LOCAL CONTACT of ID14-EH3 or the qualified maintenance personnel;
The Sample Changer power supply must be cut.

- Inspect visually the capillary by using the application software.

If it is broken or dirty:

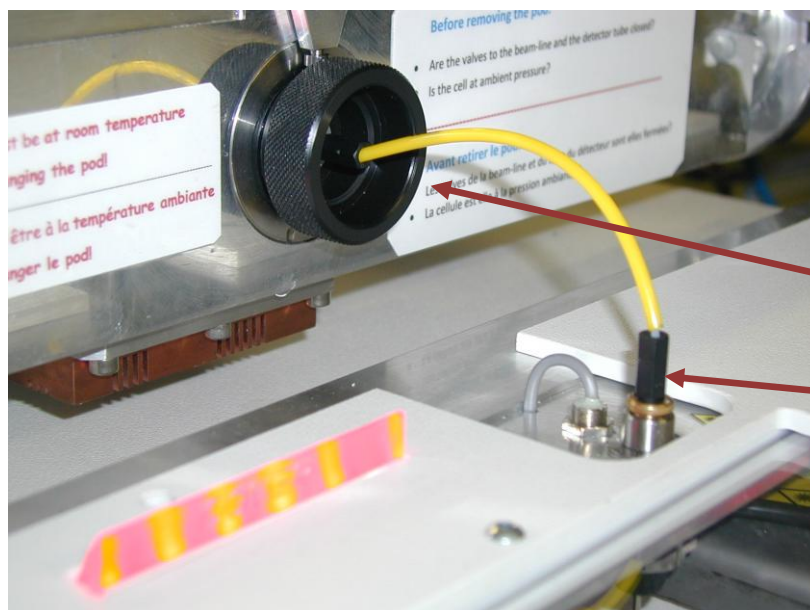
- Put SEU at room temperature,
- Stop the Sample Changer and close the application software,
- Close the two isolation valves as well as the valve of the vacuum pump,
- Checking SEU is at room pressure by mean of ESRF BioSaxs application

- Unscrew the tube coming from the capillary on the syringe side (following picture),



Unscrew
here

Unscrew and pull out



POD black stop piece

Unscrew

- Unscrew tube close to the POD black stop piece, and tube connector close to needle,
- Pull out the POD by mean of specific tool (clamp) closed to SCU,
- Change the POD,
- Replace the POD (orient the alignment pin upwards),
- Screw the POD black stop piece and the tube,
- Reconnect the tube coming from the capillary to the syringe,
- Activate the vacuum by the ESRF BioSaxs application software,
- Wait until the vacuum is correct,
- Restart the Sample Changer and the application software,
- Clean the capillary and tubing with a normal cleaning cycle.

Note : If the vacuum does not reach the correct level the capillary is

leaking and must be replaced once again. If the problem persists contact a member of the maintenance personnel.

3.1.3 Loading or unloading samples into the Sample Changer

- On BSSC application software click on « LOAD », « Cover locked » must become blue.
- Open cover,



- Remove, if necessary, adhesive tape and PCR tubes of the samples and buffers ...
- Put in the PCR tubes with your sample of interest and buffers or well plates ...
- Cover if necessary with adhesive tape,
- Close the cover.
- On BSSC application software click on « Scan and Parked », « Cover locked » must become green.

NOTE : Use only compatible well plates, PCR – Ependorf tubes with the SC. Contact local contact to obtain the different parts references.

Check that the samples do not contain bubbles before putting them into the Sample Changer !